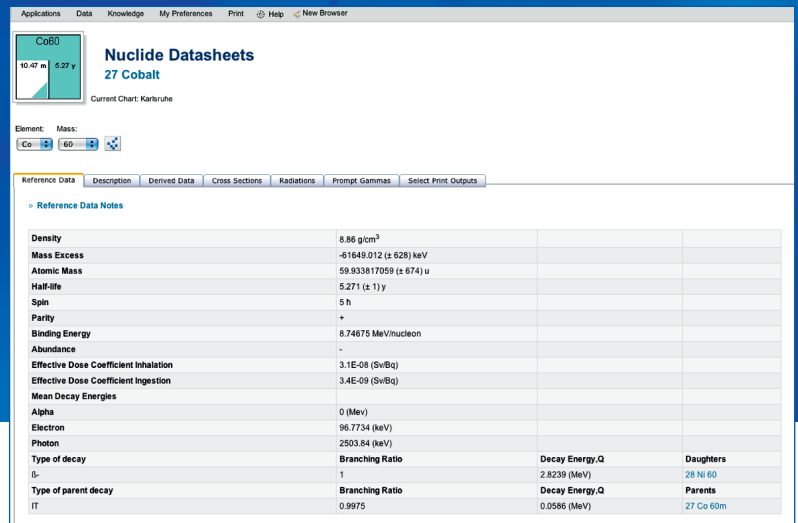


DataSheets



The screenshot shows the Nucleonica Nuclide DataSheet for ⁶⁰Co. The interface includes a top navigation bar with links for Applications, Data, Knowledge, My Preferences, Print, Help, and New Browser. The main title is "Nuclide DataSheets" for "27 Cobalt". Below the title, there are tabs for Reference Data, Description, Derived Data, Cross Sections, Radiations, Prompt Gammas, and Select Print Outputs. The Reference Data tab is active, displaying a table of nuclear data for ⁶⁰Co.

Property	Value	Decay Energy, Q	Daughters
Density	8.86 g/cm ³		
Mass Excess	-61649.012 (± 628) keV		
Atomic Mass	59.933817059 (± 674) u		
Half-life	5.271 (± 1) y		
Spin	5 h		
Parity	+		
Binding Energy	8.74675 MeV/nucleon		
Abundance	-		
Effective Dose Coefficient Inhalation	3.1E-08 (Sv/Bq)		
Effective Dose Coefficient Ingestion	3.4E-09 (Sv/Bq)		
Mean Decay Energies			
Alpha	0 (MeV)		
Electron	96.7734 (keV)		
Photon	2503.84 (keV)		
Type of decay	Branching Ratio	Decay Energy, Q	Daughters
β-	1	2.8239 (MeV)	28 Ni 60
Type of parent decay	Branching Ratio	Decay Energy, Q	Parents
IT	0.9975	0.0586 (MeV)	27 Co 60m

Nuclide DataSheets

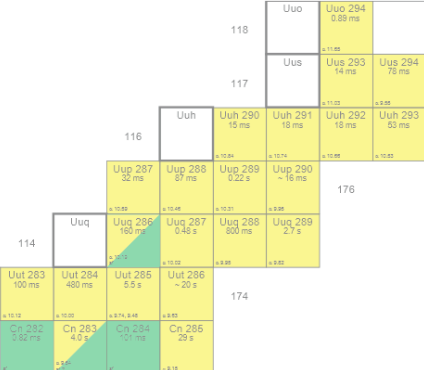
The basic nuclear data in Nucleonica is contained within the DataSheets shown above. The active tab shows the Reference Data for the nuclide Co-60. Additional tabs provide access to *Description*, *Derived Data*, *Cross Sections*, *Radiations*, and *Prompt Gamma* radiation data. The *Reference Data* includes density, mass excess, atomic mass, half-life, spin, parity, abundance, binding energy, effective dose coefficients for inhalation and ingestion e(50), mean decay energies for alpha, electron and photon, types of decay, branching ratios, decay energy and daughter nuclides. The *Description* tab gives literature references for the basic data. This data originates from the JEFF3.1 nuclear datafile with some corrections.

Derived Data

Derived Data are obtained from the basic data and include the specific activity; the isotopic powers for α , $\alpha + \beta$, and $\alpha + \beta + \gamma$ (heat generation); specific gamma dose rate in air at 1m and gamma dose rate constant (gamma emission); spontaneous fission and neutron emission rates (neutron emission); annual limits of ingestion and inhalation (radiotoxicities) and derived air and water concentrations; the A1 and A2 activity and activity exemption limits for packaging and transportation.

Radiations

In the radioactive decay process, a variety of particles and/or photons can be emitted including alpha particles, electrons, gamma and X-ray photons. In the Radiations tab, a list of the energies and emission probabilities of the emitted particles/photons is given in both tabular and graphical forms. The underlying data is from the JEFF3.1 datafile or the 8th Table of Isotopes. In the *Prompt Gamma* tab, prompt gamma activation data for thermal neutron activation analysis is listed. Additional data include photon mass attenuation and mass energy absorption coefficients, and build-up factors to model the scattering effects in the shield material.

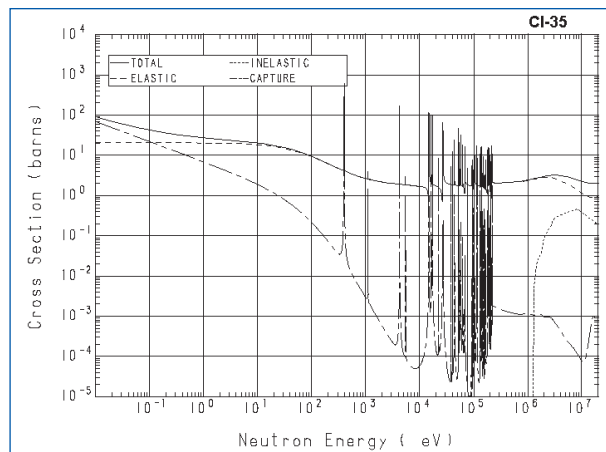


DID YOU KNOW

- Nucleonica contains data from international datafiles such as JEFF3.1, 8th Table of Isotopes, ICRP 68 & 72, etc.
- There are currently more than 3100 nuclide ground states and over 700 isomers in the Nucleonica database.
- The database contains more than 53000 gamma and X-rays from approximately 1300 nuclides.

Cross Sections

Averaged thermal cross section data is based on JEF Report 14, *Table of Simple Integral Neutron Cross Section Data from JEF-2-2, ENDFB-VI, JENDL-3.2, BROND-2, and CENDL-2*. The data include the averaged cross sections (2200 m/s, Maxwell average, resonance integral, 14 MeV, and fission spectrum average) for a range of important nuclear reactions including (n,gamma; n,fission; n,2n; n,3n; elastic; inelastic and total) and from a variety of databases. Point-wise, average (multi-group), and (x,xn) cross sections as a function of energy are shown in graphical form (where available).



Physical Constants

The physical constants page contains basic physical constants such as masses of neutrons, protons, electrons, etc. The values of the constants provided are recommended for international use by CODATA and are the latest available and are generally recognized worldwide for use in all fields of science and technology.

Conversion Factors

Conversion Factors are given for mass, energy, energy dose, ion dose, time and activity. There is an additional tab for prefixes and the Greek alphabet.

Physical Constants	Conversion Factors	Prefixes / Greek Alphabet	Radiological Limits
Conversion Factors			
Type	Conversion		
Mass	1 kg = 6.022 1415(10) x 10 ²⁶ u		
Mass	1 u = 1.660 538 86(28) x 10 ⁻²⁷ kg		
Energy	1 J = 6.241 509 47(53) x 10 ¹⁸ eV		
Energy	1 eV = 1.602 176 53(14) x 10 ⁻¹⁹ J		
Energy	1 eV/atom ~ 23 kcal mol ⁻¹		
Energy	1 MWd ~ 2.7 x 10 ²¹ fissions (~ 1 g fissionable material)		
Energy dose	1 Gy = 1 J kg ⁻¹		
Energy dose	1 rad = 10 ⁻² J kg ⁻¹		
Energy dose	1 rem = 10 ⁻² Sv		
Energy dose	1 Sv = 100 rem		
Ion dose	1 C kg ⁻¹ = 3.876 x 10 ³ R		
Ion dose	1 R = 2.58 x 10 ⁻⁴ C kg ⁻¹		
Time	1 year (365.2422 days) = 3.155692608 x 10 ⁷ s		
Time	1 month = 1 year/12 = 2.62974384 x 10 ⁶ s		
Time	1 week = 6.048 x 10 ⁵ s		
Time	1 day = 8.640 x 10 ⁴ s		
Activity	1 Bq = 1 disintegration s ⁻¹		
Activity	1 Ci = 3.7 x 10 ¹⁰ Bq		
Activity	1 Bq = 2.7 x 10 ⁻¹¹ Ci		

Radiological Limits

Radiological Limits give radiation limits for workers, apprentices and students, and members of the public. The values given are recommended by international organisations such as Euratom, ICRP, and IAEA and the national German authorities. Dose limits given are for whole and partial body (eyes, hands, skin, etc.) exposure. For apprentices and students, data is given for ages less than 16 years, 16-18 years and over 18 years old.

More information can be found on www.nucleonica.com/wiki

Radiological Limits

Workers	Apprentices and Students	Members of the Public
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Workers

Dose Limits for exposed workers	Euratom	ICRP	IAEA	Germany
Limit on effective dose for exposed workers in a consecutive 5 years period:	100 mSv	20 mSvly	20 mSvly	20 mSvly
Maximum effective dose in any single year:	50 mSvly	50 mSvly	50 mSvly	50 mSvly
Equivalent dose limit to the foetus, accumulated over the period of time between declaration of pregnancy to the delivery date:	1 mSv	2 mSv		1 mSv
Pregnant woman				2 mSv/m
Total work life (50 y)				400 mSv
Partial body exposure:				
Limit on equivalent dose for the lens of the eyes:	150 mSvly	150 mSvly	150 mSvly	150 mSvly
Limit on equivalent dose for the skin:	500 mSvly	500 mSvly	500 mSvly	500 mSvly
Limit on equivalent dose for the hands, forearms, feet and ankles:	500 mSvly	500 mSvly	500 mSvly	500 mSvly